

CLAIMS

What is claimed:

1. A method of testing a circuit on each of a plurality of separate substrates, comprising:

locating the plurality of separate substrates in a transfer apparatus, each substrate including a plurality of separate dies;

securing the substrates to a test chuck so that the substrates are simultaneously held by the test chuck;

moving terminals on at least one of the substrates into contact with contacts to electrically connect the circuit of the substrate through the terminals and the contacts to an electric tester;

relaying signals through the terminals and the contacts between the electric tester and the circuit;

disengaging the terminals from the contacts; and

removing the substrate from the test chuck.

2. The method of claim 1 wherein the transfer apparatus is a transfer chuck, a plurality of substrates are simultaneously located in the transfer chuck, surfaces of the test chuck are brought into contact with each substrate, each substrate is

secured to the test chuck, moving of the test chuck relative to the transfer chuck moving the substrates simultaneously off the transfer chuck and simultaneously past the image recordation device to record an image of a surface of each substrate.

3. The method of claim 2 wherein opposing edges of each substrate are located on two respective horizontal ledges and the surfaces of the test chuck move upward in between the ledges into contact with the substrates to lift the substrates from the ledges, whereafter the surfaces of the test chucks move in a horizontal direction to move the substrates off the transfer chuck.
4. The method of claim 2 wherein the substrates are secured to the transfer chuck by applying a vacuum to an opening extending into the surfaces of the test chuck.
5. The method of claim 1 wherein successive sets of terminals on the substrate are brought into contact with and disengaged from the contacts successively one after another.
6. The method of claim 2 wherein the substrates are removed from the test chuck by:

moving the test chuck relative to the transfer chuck so that the substrates move onto the transfer chuck;

disengaging the substrates from the test chuck; and

moving the surface of the test chuck away from the substrates so that the substrates are again held by the transfer chuck; and

removing the substrates from the transfer chuck.

7. The method of claim 2 wherein the transfer chuck has a plurality of slots, each holding a respective one of the substrates.

8. The method of claim 1 further comprising:
simultaneously heating or cooling the substrates while held by the transfer chuck.

9. The method of claim 8 wherein the substrates are heated or cooled by a thermal conditioning chuck on which the substrates are located.

10. The method of claim 8 wherein the transfer chuck is moved horizontally after heating or cooling of the substrates so as to move the substrates away from the thermal conditioning chuck.

11. The method of claim 9 wherein surfaces of the thermal conditioning chuck are moved toward the substrates before being heated or cooled, and moved away from the substrates after the substrates are heated or cooled.

12. The method of claim 11 wherein the transfer chuck has a plurality of ledges, opposing edges of each substrate being located on a respective pair of the ledges, the surfaces of the thermal conditioning chuck being inserted between each respective pair of ledges while moving toward the substrates.

13. A method of testing a circuit on each of a plurality of separate substrates, comprising:

- locating the plurality of separate substrates in a transfer chuck;
- moving a surface of a test chuck into contact with the substrates held by the transfer chuck;
- securing the substrates to the test chuck;
- moving the test chuck relative to the transfer chuck so that the substrates simultaneously move off the transfer chuck;
- moving terminals on each substrate into contact with contacts to electrically connect the circuit through the terminals and the contacts to an electric tester;
- relaying signals through the terminals and the contacts between the

electric tester and the circuit;

disengaging the terminals from the contacts; and

removing the substrates from the test chuck.

14. An apparatus for testing circuits on substrates comprising:

a support frame;

a transfer chuck having a plurality of slots, each capable of holding a separate substrate;

a test chuck located on the frame and being movable relative to the transfer chuck so that surfaces of the test chuck move into contact with the substrates, the substrates being simultaneously securable to the test chuck, the test chuck being movable relative to the transfer chuck so that the substrates move off the transfer chuck;

a plurality of contacts secured to the support frame, the test chuck and the contacts being movable relative to one another so that the contacts contact terminals on the substrates; and

an electric tester connected to the contacts so that signals can be relayed through the terminals and the contacts between the electric tester and the circuit.

15. The apparatus of claim 14 wherein the transfer chuck has a plurality of ledges, opposing edges of each substrate being supported on a respective pair of

the ledges, the surfaces of the test chuck being insertable between a respective pair of ledges when moving toward the substrates.

16. The apparatus of claim 14 wherein the test chuck has a suction passage in each surface, to which a vacuum can be applied so that the substrates are secured to the surfaces.

17. The apparatus of claim 14 wherein the transfer chuck has at least twice as many slots as the surfaces of the test chuck, the transfer chuck and the test chuck being movable relative to one another to align the surfaces of the test chuck with the slots.

18. The apparatus of claim 17 wherein the transfer chuck is movable relative to the frame.

19. The apparatus of claim 14 further comprising:
a thermal conditioning chuck capable of heating or cooling the substrates while held by the transfer chuck.

20. The apparatus of claim 15 further comprising:
a thermal conditioning chuck having a plurality of surfaces each being

insertable between a respective pair of the ledges.

21. An apparatus for testing circuits on substrates comprising:

a support frame;

a transfer apparatus capable of holding at least one of a plurality of separate substrates;

a test chuck located on the frame, having a surface with a plurality of raised formations alternated by a plurality of recesses, and being movable relative to the transfer apparatus so that surfaces of each raised formation move into contact with a respective substrate, the substrates being simultaneously securable to the test chuck, each substrate to a respective surface of a respective raised formation, the test chuck being movable relative to the transfer chuck so that the substrates move off the transfer chuck;

a plurality of contacts secured to the support frame, the test chuck and the contacts being movable relative to one another so that the contacts contact terminals on the substrates; and

an electric tester connected to the contacts so that signals can be relayed through the terminals and the contacts between the electric tester and the circuit.

22. The apparatus of claim 21 wherein the transfer apparatus is stationary.

23. The apparatus of claim 21 wherein the test chuck includes a first portion which is movable relative to the frame and a second portion which is disengageably secured to the first portion, the second portion having the raised and recessed formations.

24. The apparatus of claim 21 wherein at least one of the raised formations has a recess into which at least one of the substrates is located.